

give it support, such as the opacity of the crystalline lens, he admitting that, were it possible for an animal to revive after complete congelation, it would be blind from cataract? Now, if the crystalline lens, if the blood-corpuscles suffer and undergo an appreciable change from congelation, it would be very remarkable indeed did not the brain and nerves, and the organs generally suffer from the same cause, and experience changes incompatible with life. In the instance of man, we know that a certain reduction of his temperature merely, not reaching to congelation, suffices to extinguish life*, and that in the instances of other animals, especially the hibernating and insects, a moderate reduction occasions torpor, ending in death if too prolonged. That the organs generally suffer from congelation M. Puget himself admits, as expressed in the subjoined paragraph†. I have found, too, that the muscles, after having been frozen, exhibit a marked change; thus, in one instance, that of a frog, in which, after decapitation, an upper and lower extremity were frozen, the muscles of these limbs, when thawed, compared with those which had not been frozen, showed a well-marked difference under the microscope. Thus, whilst in the latter the striated structure was very distinct, in the former it was no longer visible; and after a few hours, viz. on the following morning, whilst the unfrozen muscles had undergone no perceptible alteration, those which had been frozen had become of increased tenderness, yielding to a slight rending force, and breaking short, as if the coherence of the particles forming the fasciculi was greatly diminished.

II. "Letter to the President from Lieut.-Colonel WALKER, R.E., F.R.S., Superintendent of the Trigonometrical Survey of India."

Dehra Doon *via* Bombay, 31st May, 1866.

MY DEAR GENERAL,—Captain Basevi has just returned to my head quarters, on the close of the operations of his first field-season with the pendulums.

You will be glad to hear that his progress has on the whole been very satisfactory. At the outset he met with numerous difficulties; the vacuum apparatus was very troublesome, the air-pump constantly getting out of order, and the receiver as constantly leaking. It is very easy for philosophers to suggest improvements and refinements in the *modus operandi* of such operations, but it is not so easy to carry them out practically. Capt. Basevi has undergone a great amount of labour and anxiety, but he has successfully surmounted all his difficulties.

* Instances have occurred in the Lake District of persons who have perished on the hills from prolonged exposure to strong wind and rain, *storm-stricken*, in the language of the country.

† "... La congélation complète a même si profondément altéré les tissus de l'organisme que quand l'animal est tout à fait dégelé, son corps est flasque et mou, ses cristallins sont blancs et opaques, et souvent sa coloration est tout à fait altérée " (p. 24).

He has taken experiments at the following stations, which you will find in the chart at the end of Everest's description of the measurement of the Indian Arc, Dehra Doon, Nojli, Kaliaua, Dateri, and Usira. At Dehra Doon he took six sets of observations with each pendulum; but finding he could advance more rapidly than the observatories could be got ready for him, at the subsequent stations he took ten sets of observations with each pendulum. Each set was carried over eight to nine hours, from 9 A.M. to 5½ P.M. The pendulum was set in motion in the morning, the coincidences were observed, and the thermometers and arc of vibration were read hourly, until the set terminated in the afternoon. The first and last coincidences will be used only for determining the number of vibrations; but the whole of the intermediate temperatures and arcs will be employed for determining the corrections for temperature and arc. He was very fortunate in his transits, only losing four nights in sixty; complete sets of observations were twice taken at Kaliaua (the northern extremity of the Indian arc) in December, when the temperature was lowest, and again this month when it was highest; the range was not so great as we had anticipated, being 58° in the first instance, and 92° in the second, so that the results will scarcely be applicable to the observations at Kew, where, to the best of my recollection, the temperature was between 40° and 50°; but they will amply suffice for all the observations that are likely to be taken in India. He endeavoured to observe at a constant pressure, but the leaking of the cylinder prevented this; however, the whole range of pressure does not exceed 3 inches, and the average range is much less, the maximum being 5 inches and the minimum 2. He is about to commence a series of observations at Masoori, at an altitude of about 6800 feet above the sea. He hopes to complete these during June, before the rainy season sets in, when transits will be impossible.

During the rains he will be employed in completing the calculations connected with his experiments. By September I hope to be able to send you the final results.

He has had so much to do in surmounting the difficulties arising from his new apparatus, that he could not manage to take any magnetic observations. In future, however, he hopes to be able to take these observations regularly at each of his pendulum stations.

I trust that you will be gratified with this account of his first year's operations. No pains have been spared to secure results of the highest possible value, and to reward the confidence you reposed in us, when you suggested to the India Office that we should undertake these delicate and difficult operations.

Believe me, yours sincerely,

General Sabine, P.R.S.

J. WALKER.